

1. SCOPE

1.1 Scope. This drawing describes device requirements for class B microcircuits in accordance with 1.2.1 of MIL-STD-883, "Provisions for the use of MIL-STD-883 in conjunction with compliant non-JAN devices".

1.2 Part number. The complete part number shall be as shown in the following example:

<u>5962-86853</u>	<u>01</u>	<u>C</u>	<u>X</u>
Drawing number	Device type (1.2.1)	Case outline (1.2.2)	Lead finish per MIL-M-38510

1.2.1 Device type. The device type shall identify the circuit function as follows:

<u>Device type</u>	<u>Generic number</u>	<u>Circuit</u>
01	54HCT74	Dual D-type flip-flop with preset and clear with LSTTL compatible inputs

1.2.2 Case outline. The case outline shall be as designated in appendix C of MIL-M-38510, and as follows:

<u>Outline letter</u>	<u>Case outline</u>
C	D-1 (14- lead, 1/4" x 3/4"), dual-in-line package

1.3 Absolute maximum ratings. 1/

Supply voltage range	-0.5 V dc to +7.0 V dc
DC input voltage	-0.5 V dc to $V_{CC} + 0.5$ V dc
DC output voltage	-0.5 V dc to $V_{CC} + 0.5$ V dc
Claim diode current	± 20 mA
DC output current (per pin)	± 25 mA
DC V_{CC} or GND current (per pin)	± 50 mA
Storage temperature range	-65°C to +150°C
Power dissipation, P_D	500 mW 2/
Lead temperature (soldering, 10 seconds)	+260°C
Thermal resistance, junction-to-case (θ_{JC}):	
Case C	In accordance with MIL-M-38510, appendix C
Junction temperature (T_J)	175°C

1/ Unless otherwise specified, all voltages are referenced to ground.

2/ For $T_C = +100^\circ\text{C}$ to $+125^\circ\text{C}$, derate linearly at 12 mW/ $^\circ\text{C}$.

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1.4 Recommended operating conditions.

Supply voltage (V_{CC})	+4.5 V dc to +5.5 V dc
Case operating temperature range (T_C)	-55° C to +125° C
Input rise or fall time $V_{CC} = 4.5 \text{ V}$	0 to 500 ns
Minimum setup time, data clock \uparrow (t_{SHL1}) (t_{SLH1}): $V_{CC} = 4.5 \text{ V}, T_C = 25^\circ \text{C}$	20 ns
$T_C = -55^\circ/+125^\circ \text{C}$	30 ns
Minimum setup time, preset or clear to clock \uparrow (t_{SHL2}): $V_{CC} = 4.5 \text{ V}, T_C = 25^\circ \text{C}$	20 ns
$T_C = -55^\circ/+125^\circ \text{C}$	30 ns
Minimum width of clock, preset or clear pulse (t_W): $V_{CC} = 4.5 \text{ V}, T_C = 25^\circ \text{C}$	20 ns
$T_C = -55^\circ/+125^\circ \text{C}$	30 ns
Minimum hold time, clock to data \uparrow (t_{HHL}) (t_{HLH}): $V_{CC} = 4.5 \text{ V}, T_C = 25^\circ \text{C}$	3 ns
$T_C = -55^\circ/+125^\circ \text{C}$	3 ns
Maximum clock frequency f_{MAX}): $V_{CC} = 4.5 \text{ V}, T_C = 25^\circ \text{C}$	25 MHz
$T_C = -55^\circ/+125^\circ \text{C}$	16 MHz

2. APPLICABLE DOCUMENTS

2.1 Government specification and standard. Unless otherwise specified, the following specification and standard, of the issue listed in that issue of the Department of Defense Index of Specifications and Standards specified in the solicitation, form a part of this drawing to the extent specified herein.

SPECIFICATION

MILITARY

MIL-M-38510 - Microcircuits, General Specification for.

STANDARD

MILITARY

MIL-STD-883 - Test Methods and Procedures for Microelectronics.

(Copies of the specification and standard required by manufacturers in connection with specific acquisition functions should be obtained from the contracting activity or as directed by the contracting activity.)

2.2 Order of precedence. In the event of a conflict between the text of this drawing and the references cited herein, the text of this drawing shall take precedence.

3. REQUIREMENTS

3.1 Item requirements. The individual item requirements shall be in accordance with 1.2.1 of MIL-STD-883, "Provisions for the use of MIL-STD-883 in conjunction with compliant non-JAN devices" and as specified herein.

3.2 Design, construction, and physical dimensions. The design, construction, and physical dimensions shall be as specified in MIL-M-38510 and herein.

3.2.1 Terminal connections. The terminal connections shall be as specified on figure 1.

3.2.2 Truth table and logic diagram. The truth table and logic diagram shall be as specified on figure 2.

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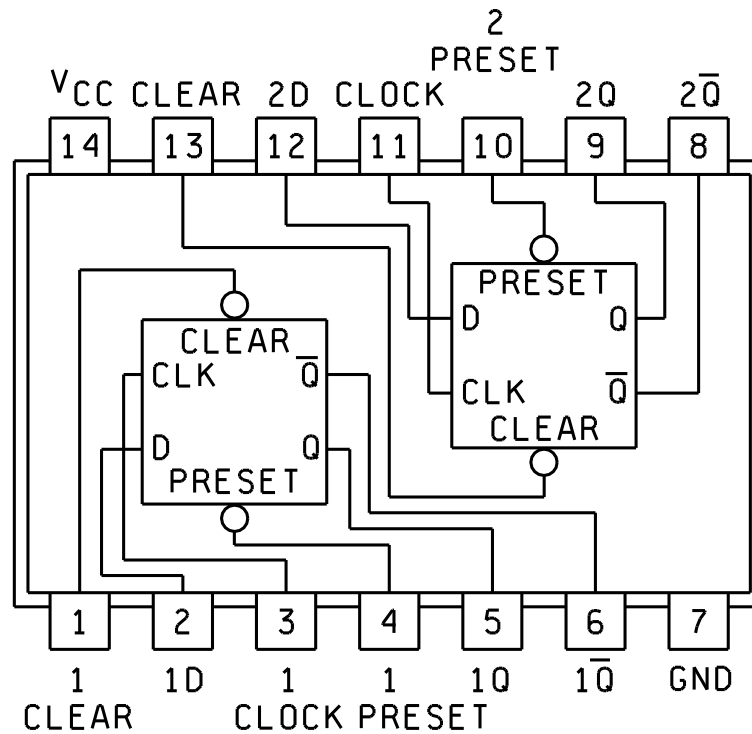


FIGURE 1. Terminal connections (top view).

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Device type 01

INPUTS				OUTPUTS	
PRESET	CLEAR	CLOCK	D	Q	\bar{Q}
L	H	X	X	H	L
H	L	X	X	L	H
L	L	X	X	H*	H*
H	H	↑	H	H	L
H	H	↑	L	L	H
H	H	L	X	Q ₀	\bar{Q}_0

H = High level (steady state).

L = Low level (steady state)

X = Irrelevant

↑ = Transition from low to high level.

Q₀ = The level of Q before the indicated steady state input conditions were established.

* This configuration is nonstable: that is, it will not persist when preset and clear inputs return to their inactive (high) level.

Device type 01

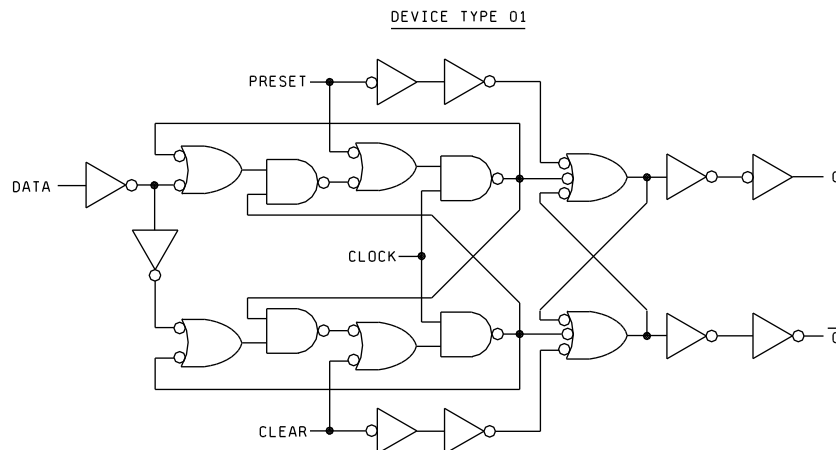


FIGURE 2. Truth table and logic diagram

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For f_{MAX} , input duty cycle = 50 %

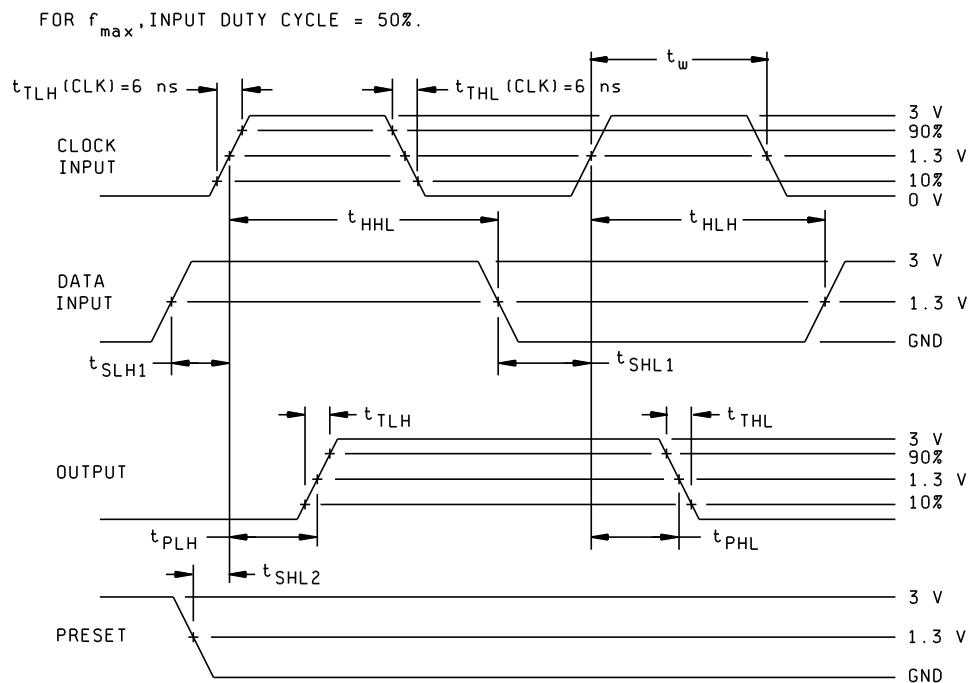


FIGURE 3. Switching waveforms.

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TABLE I. Electrical performance characteristics.

Test	Symbol	Conditions <u>1/</u> -55°C ≤ T _C ≤ +125°C 4.5 V dc ≤ V _{CC} ≤ 5.5 V dc (Unless otherwise specified)	Group A subgroups	Limits		Unit
				Min	Max	
High-level output voltage	V _{OH}	V _{IN} = V _{IH} or V _{IL} V _{CC} = 4.5 V	I _O ≤ 20 μA	1, 2, 3	4.4	V
			I _O ≤ 4.0 mA	1, 2, 3	3.7	V
Low-level output voltage	V _{OL}	V _{IN} = V _{IH} or V _{IL} V _{CC} = 4.5 V	I _O ≤ 20 μA	1, 2, 3		0.1
			I _O ≤ 4.0 mA	1, 2, 3		0.4
High-level input voltage	V _{IH}			1, 2, 3	2.0	V
Low-level input voltage	V _{IL}			1, 2, 3		0.8
Input leakage current	I _{IN}	V _{CC} = 5.5 V; V _{IN} = V _{CC} or GND		1, 2, 3	-1	1
Quiescent current	I _{CC}	V _{IN} = V _{CC} or GND; V _{CC} = 5.5 V; I _{OUT} = 0 μA		1, 2, 3		80
Addition quiescent current	ΔI _{CC}	V _{IN} = 2.4 or 0.5 V, any pin other pins V _{IN} = V _{CC} or GND		1, 2, 3		1.8
Input capacitance	C _{IN}	See 4.3.1c	4			10
Functional tests		See 4.3.1d	7			
Propagation delay from clock to Q or Q	t _{PLH1} t _{PHL1}	V _{CC} = +5.0 V ±10% C _L = 50 pF ±10% See figure 3	T _C = 25°C	9		35
			T _C = -55°C, +125°C	10, 11		53
Propagation delay time; <u>—</u> preset or clear to Q or Q	t _{PLH2} t _{PHL2}	V _{CC} = +5.0 V ±10% C _L = 50 pF ±10% See figure 3	T _C = 25°C	9		40
			T _C = -55°C, +125°C	10, 11		60
Transistion times <u>2/</u>	t _{TLH} t _{THL}	V _{CC} = +5.0 V ±10% C _L = 50 pF ±10% See figure 3	T _C = 25°C	9		15
			T _C = -55°C, +125°C	10, 11		22

1/ For a power supply of 5 V ±10 percent the worst case output voltages (V_{OH} and V_{OL}) occur for HCT at 4.5 V. Thus the 4.5 V values should be used when designing with this supply. Worst case V_{IH} and V_{IL} occur at V_{CC} = 5.5 V and 4.5 V respectively.

2/ Transition times (t_{THL}, t_{TLH}) is not tested shall be guaranteed to the specified.

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3.2.3 Case outline. The case outline shall be in accordance with 1.2.2 herein.

3.3 Electrical performance characteristics. Unless otherwise specified, the electrical performance characteristics are as specified in table I and apply over the full recommended case operating temperature range.

3.4 Marking. Marking shall be in accordance with MIL-STD-883 (see 3.1 herein). The part shall be marked with the part number listed in 1.2 herein. In addition, the manufacturer's part number may also be marked as listed in 6.4 herein.

3.5 Certificate of compliance. A certificate of compliance shall be required from a manufacturer in order to be listed as an approved source of supply in 6.4. The certificate of compliance submitted to DESC-ECS prior to listing as an approved source of supply shall state that the manufacturer's product meets the requirements of MIL-STD-883 (see 3.1 herein) and the requirements herein.

3.6 Certificate of conformance. A certificate of conformance as required in MIL-STD-883 (see 3.1 herein) shall be provided with each lot of microcircuits delivered to this drawing.

3.7 Notification of change. Notification of change to DESC-ECS shall be required in accordance with MIL-STD-883 (see 3.1 herein).

3.8 Verification and review. DESC, DESC's agent and the acquiring activity retain the option to review the manufacturer's facility and applicable required documentation. Offshore documentation shall be made available onshore at the option of the reviewer.

4. QUALITY ASSURANCE PROVISIONS

4.1 Sampling and inspection. Sampling and inspection procedures shall be in accordance with section 4 of MIL-M-38510 to the extent specified in MIL-STD-883 (see 3.1 herein).

4.2 Screening. Screening shall be in accordance with method 5004 of MIL-STD-883, and shall be conducted on all devices prior to quality conformance inspection. The following additional criteria shall apply:

a. Burn-in test (method 1015 of MIL-STD-883).

(1) Test condition A, B, C, or D using the circuit submitted with the certificate of compliance (see 3.5 herein).

(2) $T_A = +125^\circ\text{C}$, minimum.

b. Interim and final electrical test parameters shall be as specified in table II herein, except interim electrical parameter tests prior to burn-in are optional at the discretion of the manufacturer.

4.3 Quality conformance inspection. Quality conformance inspection shall be in accordance with method 5005 of MIL-STD-883 including groups A, B, C, and D inspections. The following additional criteria shall apply.

4.3.1 Group A inspection.

a. Tests shall be as specified in table II herein.

b. Subgroups 5, 6, and 8 in table I, method 5005 of MIL-STD-883 shall be omitted.

c. Subgroup 4 (C_{IN} measurement) shall be measured only for the initial test and after process or design changes which may affect input capacitance.

d. Subgroups 7 tests sufficiently to verify the truth table.

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4.3.2 Groups C and D inspections.

- a. End-point electrical parameters shall be as specified in table II herein.
- b. Steady-state life test (method 1005 of MIL-STD-883) conditions:
 - (1) Test condition A, B, C, or D using the circuit submitted with the certificate of compliance (see 3.5 herein).
 - (2) $T_A = +125^\circ\text{C}$, minimum.
 - (3) Test duration: 1,000 hours, except as permitted by appendix B of MIL-M-38510 and method 1005 of MIL-STD-883.

TABLE II. Electrical test requirements.

MIL-STD-883 test requirements	Subgroups (per method 5005, table I)
Interim electrical parameters (method 5004)	1
Final electrical test parameters (method 5004)	1 * , 2, 3, 9
Group A test requirements (method 5005)	1, 2, 3, 4, 7, 9, 10, 11
Groups C and D end-point electrical parameters (method 5005)	1, 2, 3
Additional electrical subgroups for group C periodic inspections	- - -

* PDA applies to subgroup 1.

5. PACKAGING

5.1 Packaging requirements. The requirements for packaging shall be in accordance with MIL-M-38510.

6. NOTES

6.1 Intended use. Microcircuits conforming to this drawing are intended for use when military specifications do not exist and qualified military devices that will perform the required function are not available for OEM application. When a military specification exists and the product covered by this drawing has been qualified for listing on QPL-38510, the device specified herein will be inactivated and will not be used for new design. The QPL-38510 product shall be the preferred item for all applications.

6.2 Replaceability. Microcircuits covered by this drawing will replace the same generic device covered by a contractor-prepared specification or drawing.

6.3 Comments. Comments on this drawing should be directed to DESC-ECS, Dayton, Ohio 45444, or telephone 513-296-5375.

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6.4 Approved source of supply. An approved source of supply is listed herein. Additional sources will be added as they become available. The vendor listed herein has agreed to this drawing and a certificate of compliance (see 3.5) has been submitted to DESC-ECS.

Military drawing part number	Vendor CAGE number	Vendor Similar part number <u>1/</u>
5962-8685301CX	18714 27014	CD54HCT74F/3A MM54HCT74J/883

1/ Caution. Do not use this number for item acquisition. Items acquired to this number may not satisfy the performance requirements of this drawing.

Vendor CAGE
number

27014

18714

Vendor name
and address

National Semiconductor
2900 Semiconductor Dr.
Santa Clara, CA. 95051

RCA Coporation
Route 202
Somerville, NJ 08876

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